

Chalcolithic settlement strategies of the Bošáca culture in the White Carpathians

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Abstract– The paper observes the system strategies of the Bošáca archaeological culture (3200-2800 BC) in the White Carpathians microregion and its adaptation to environmental conditions in order to understand how they could affect its settlement development. The Bošáca intercultural conditions in the relatively small area of the White Carpathians appear to be quite variable (type of settlement, funeral rituals), which can be assumed in the economic aspects of society. In this context, it is necessary to perceive specific sources of the radiolarite in the area of the Vlára pass, because it can be very closely related to the contrasting settlement strategies of one culture in the microregion. This element could increase the local centrality of the society, where this culture have been creating a specific product range for regional and long-distance trade.

Index Terms– The Bošáca culture, radiolarite, The White Carpathians, settlement strategies, long-distance trade, Bošáca – Pohanské pole, Bánov – Hrad, Ivanovce – Skala

1 INTRODUCTION

The White Carpathians microregion is an ideal area for studying this type of research not only for its cultural and environmental diversity, but also because it has relatively long and extensive archaeological research related to the Bošáca culture. In an effort to describe the microregional model of the Bošáca culture settlement strategy, particular attention will be paid to the three economic aspects: regional trade, craft production and agricultural affairs, also emphasizing the importance of long-distance trade links for suppressing a periodic scarcity of resources or promoting commodity movement between environmentally diverse regions.

In order to explore the environmental context of the settlements, other attributes, such as local altitude, distance from the nearest potential water source, soil types (on the estate and in the vicinity), the climatic zone of the site or the catchment area were also selected in the study. Attention will also be paid to the concept of transhumance - prehistoric seasonal pastoralism of animals in mountain areas. In the White Carpathians region, these Chalcolithic activities at higher altitudes may indicate extraordinary species-wide and wide-lived areas of the plants, the diversity of which can only occur due to the long-term maintenance of open areas and mosaic-woodland, since the Neolithic period. The largest concentration of these areas is located near the mountain passes Javorina - Lopeník, municipalities Bánov - Radějov (Czech Republic) and Stará Turá - Zamarovce (Slovakia). Therefore, from the

point of view of potential discoveries of new Chalcolithic sites, it is necessary to observe this Carpathians region.

2 CULTURAL SITUATION

An important summary of the Bošáca culture and its cultural development in Western Slovakia in the post-Baden period was published in 1970, when the results of research in Podolie was published [1], and recently, the Slovak archaeologist J. Mellnerová-Šuteková [2],[3],[4] produced several studies of the Bošáca culture in Slovakia. The archaeological and cultural aspects of the Bošáca culture in the White Carpathians region are currently very limited, because this area belongs to unevenly explored and undervalued, with limited data of the contexts of found artefacts from surface prospects. Also, in relation to the mountain regions of Western Slovakia, it is possible to talk about the generally ambiguous cultural circumstances when is necessary to consider the surviving population of the cultural expression of Baden at the time of the existence of Bošáca culture, with the possibility of its survival until the Early Bronze Age [4].

From a settlement strategy point of view, the phenomenon of fortified settlements in the wider neighborhood of the White Carpathians were discovered in the Baden period, when the settlements with ditches and walls were built on easily accessible sides, often placed on exposed locations in the country. In this period, similar settlements can be observed at the lowland of southwestern Slovakia, when lowland settlements have significantly shifted and concentrated at higher altitudes, in the valleys of the Danube tributaries and at the foot of the mountains, but always close to the water course [4],[5]. Endogenous theory explains this phenomenon through internal processes and socio-economic changes in society. Exogenous theory provides an explanation for the emergence of fortified settlements on the hilltops as the adaptation and strategy of a particular society towards external threats (climate change, disease) [6].

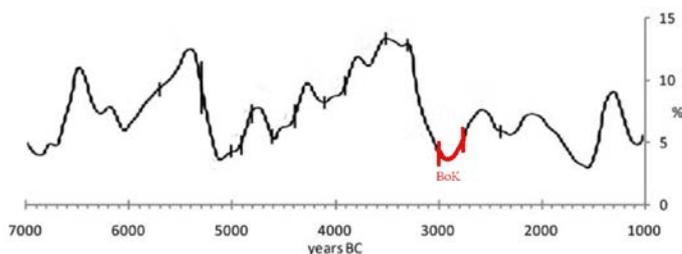


Fig. 1. Holocene climate change with marked stage of the archaeological culture Bošáca (X), and precipitation (Y) [7].

Site	Altitude	Fortified
Bánov - Hrad	300	X
Bošáca - Pohanské pole	240	?
Ivanovce - Skala	215	X
Moravské Lieskové - Braništia	320	?
Slavkov - Kolo	450	?
Trenčín - Polláková tehelňa	220	?
Uherský Brod - Kyčkov	220	?

Recently, several studies have attempted to link archaeological data with information from different climate databases. For this study, it is most appropriate to use data on glacier drift in the subpolar North Atlantic region [7], as well as previous studies by D. Gronenborn [8] which showed promising results in correlating the socio-economic development of European Neolithic with climate change. The results of interdisciplinary studies in this context have shown that there is a correlation of post-Baden activities related to shifts to higher altitudes and wetlands, and climate change [9],[10].

In the valleys of northern Slovakia, at the end of Baden period, there is significant cultural isolation, leaving no mention of a typical "catastrophic horizon" after leaving the settlement [11]. A significant reduction of the White Carpathians settlement sites during the post-Baden period may appeal to the claim that this situation is not the result of the current state of field research, and that the more unfavourable natural conditions "Fig. 1" (drought-climatic period, IRD4) have played an important role in the obscene depopulation. Radical changes in several observed environmental parameters compared to previous periods indicate that natural conditions have changed so greatly that existing subsistence strategies could become obsolete and could not keep the population. Changes in the economy had to be influenced by social councils, when social hierarchies and political destabilization could be expected [8]. After stabilizing the environment, the society could reorganize and adapt to new conditions.

In recent days, new paleogenetic studies have emerged that describe the discovery of the *Yersinia pestis* strain that caused the plague epidemic at Neolithic farmers (2900 BC), the oldest discovered case of plague and brought the characterization of the diversification of multiple basal lines that could contribute to the decline of the population at that time "Fig. 2". This study created a model combined with archaeological contextualization and aligned all paleogenetic evidence. These analyses have shown that during the decline of the Neolithic population in Europe during the Baden complex, several *Y. Pestis* families developed and expanded throughout Eurasia. Analysis of the archaeological context and human genomes revealed that the origin and spread were not caused by massive migrations but were more likely to be facilitated by lifestyle, population growth and expanding long-distance

networks (wheel development, metallurgy, animal pulling) [12].

TABLE 1
 SETTLEMENT LOCATIONS OF THE BOŠÁCA CULTURE IN THE WHITE CARPATHIANS

3 LOCATION OF SETTLEMENTS

Understanding the spatial distribution of settlements and economic activities can be of great importance in understanding Chalcolithic societies and their socio-economic contexts. It can be argued that the Bošáca settlements in the White Carpathians was primarily determined by the environmental conditions within the local landscape. In the Bošáca culture period, high-density settlements were built in the microregion of the White Carpathians in significantly exposed locations where the existence of variable forms of fortification, such as palisades, was confirmed in some cases, and their relation to lowland settlements that could be related to agro-pastoral activities. White Carpathians settlements occupied damp climatic zones, wet soil types (predominantly brown earth [2],[13]). As the most important environmental factor in the White Carpathians is an altitude with an increase in precipitation and a decrease in temperature, and from the perspective of settlement preconditions for agrarian activities, the whole Moravian part of the microregion is considerably cooler and wetter [14].

Throughout the studied area, these central settlements are located on the main river stream (Váh) or its tributaries (Bošáčka, Olšava, Klanečnica), which allowed them easier access to long-distance trade as well as controlling the

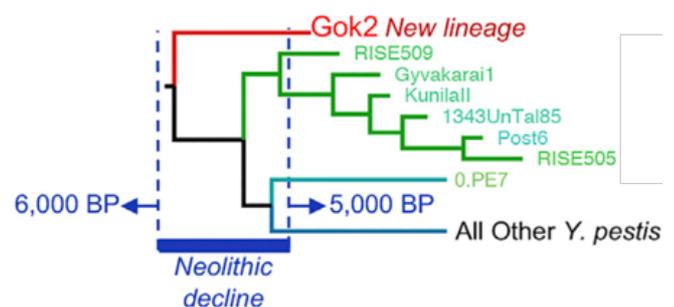


Fig. 2. Spread of the Neolithic plague pandemic [12].

movement of persons and goods on the main exchange routes. The Váh River provided the most significant long distance connection, as suggested by the new findings of the proto-Bošáca stage at the newly discovered highlands of the central Váh region - Považská Teplá, sites Niva, Dúbrava and Pod Toračkou [15],[16]. It should be emphasized that these positions have no control or direct access to the sources of radiolarite because they are located in the lowland and a at certain distance from this area. These settlements were more likely to facilitate the exchange of additional resources from lowland and mountainous areas, with the potential to act as a

communication gateway for exchange with settlements off the main trade roads as well as those located along the main river stream.

4 ECONOMIC STRATEGIES

Bošáca culture is characterized by a relatively wide range of settlements [17],[18], but the more complex answer about the number of intercultural contacts is still very unclear [2],[19],[20],[21],[22],[23],[24]. In the wider areas of Central Europe, it is possible to recognize a pottery elements that demonstrates far-reaching contacts with distances up to hundreds of kilometres (Globular Amphora culture, pit-Grave culture, Coşofeni culture, Livezile group) [3].

The distinction of the socio-economic status of the White Carpathians fortified settlements was noticed by J. Pavelčík [25], where was highlighted an increased concentration of radiolarite - local raw material that have been relatively easy to process to final products of the flint [26]. Rich sources of radiolarite in the White Carpathians region were particularly used in the Bošáca culture as the highest quality regional raw material for the flint industry, which can be dated back to the classic Baden stage [16]. It is unlikely that tools from this raw material would be exported in the final form at any significant distance, but rather a pre-prepared core trade, although no larger deposits of transported raw material were found in the Bošáca culture area.

As noted, the attention to the radiolarite that was the important known economic element of the Bošáca culture, but probably more important economic component is specialized plant and livestock production. In the Bošáca culture community, specialized land use for agricultural purposes have been also proven, except an evidence of a significant number of specialized crops (vegetables, herbs) that were grown in the vicinity of Bošáca settlement, outside classical species (predominantly wheat), which could represent an advanced diversification strategy of the community [27]. It can be argued that the agricultural strategy in this dry period was based on the use of naturally available fields on flat surfaces and relatively steep river slopes outside the floodplains that were associated with the presence of richer soils.

5 THE WHITE-CARPATHIANS TRANSHUMANCE

Calcium semi-dry grasslands in the White Carpathians are Europe's areas of the richest and most preserved species diversity (α -diversity), with the occurrence of a number of rare and endemic species not found in the neighbouring regions [28],[29],[30]. Recent archaeological and paleoecological studies have provided direct evidence of the prehistoric origin of grasslands where the high concentration of rare heliophilic species with the highest occurrence in the southwest of the White Carpathians indicates their long-term persistence since the Neolithic Period [31]. The area of the largest and most varied species is distributed between the municipalities of Bánov and

Radějov, where is an evidence of the biggest White Carpathians concentration of settlements during Neolithic and Chalcolithic periods [32].

Based on the analysis of paleobotanical and osteological findings from the Bošáca culture in the White Carpathians, there is classical trend of diversified breeding systems with lower risk. In these cases, the most prominent component of breeding of less demanding resources, such as pigs and sheep/goats, where pastoral systems were probably also aimed at the production of secondary products. There was also a greater use of wild fauna and maximalist use of the animal in terms of the individual parts of the body. The use of natural resources could change seasonally, especially fishing and hunting. In this case, the question arises as to whether this seasonal hunting was related to the more strategic use of other resources (especially domesticated) and that the community of younger-born children developed a tactic to ensure livestock supplies throughout the year. As part of a broader analysis of future studies, it would be possible to analyse seasonal timing of animal death, examine the existence of seasonal killing of domestic species and seasonal hunting activities, and then evaluate whether Chalcolithic communities have developed complementary animal feed strategies to create hypotheses of some standardization in breeding practices of younger-elite communities in Slovakia.

It is evident, that development of transhumance migratory in this period of Chalcolithic could improve the mobility of human groups, as evidenced by the sites on the opposite side of the White Carpathians (Bánov, Slavkov), as well as the circulation of raw materials and prestigious objects through the mountains. Pastoral activities could indicate the presence of artefacts likely to be associated with the transformation of milk and its derivatives or ceramic vessels analysed by MALDI analysis for the detection of proteins and lipids from animal milk. This activity could be supported in the course of metallurgy by looking for ore deposits and long-distance trade with metals. The theoretical model for the Chalcolithic community of the White Carpathians could suppose the exchange of metals / raw materials for livestock and dairy products, considering the socio-economic elite, that was performing strict control of the territory and its strategic resources.

6 CONCLUSION

Based on observed studies, it can be argued that the White Carpathians weren't a barrier to spreading post-Baden settlement strategies and did not cause isolated development within each sub-region "Tab. 1". In connection with the presence of the fortified settlements of this period, it seems very likely that these were significant and strategic locations of the Bošáca culture where the socio-economic elite of the society was concentrated.

Within this space, ordinary artefacts such as agricultural tools, pottery and small jewellery were

discovered, but very few metals, luxury products, or imports. The dwellings were located close to important communications pointing to the importance of trade, which tends to make the massive fortified settlements in the post-Baden period played an important economic role. The significance of the Váh river as the central axis linking the Považie regions and their sources of raw materials cannot be underestimated. There is a clear relationship between the White Carpathians mountains and lowland areas - control of river transport was crucial for the development of regional economic systems, and the development of land routes facilitated by the emergence of the wheel was increasingly important during the post-Baden period. As described in some chapters, regional production strategies are highly specialized, but it would be wrong to focus on radiolarite as an exclusive export product - it is also necessary to pay increased attention to specialized plant and livestock production. The extent to which agricultural production under the social arrangements of Bošáca culture could be controlled by elites is extremely bleak, and there is no doubt that additional input data is required for more detailed study on the functioning of society at the time of the Late Chalcolithic.

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